

## Adoption of the AASHTO Drainage Manual by the Montana Department of Transportation

The Hydraulics Section (Preconstruction Bureau, Engineering Division) of MDT has been revising chapters of the AASHTO Model Drainage Manual, to reflect the current procedures of the MDT Hydraulics Section.

- Chapter 7, Hydrology, was adopted October 3, 1995.
- Chapter 9, Culverts, was adopted May 16, 1996.
- Chapter 10, Bridges, was adopted July 22, 1997.
- Chapter 13, Storm Drainage Systems was adopted May 21, 1998.

The numbering system currently used is that from the Model Drainage Manual. The chapters that have been adopted supersede the information provided in the Montana Department of Highways Hydraulics Manual, dated September 1, 1975.

The end of this document contains a Table of Contents for the Model Drainage Manual. Not all of these chapters relate to work done by MDT's Hydraulics Section, nor are they necessarily applicable to MDT projects. The Table of Contents is provided here for information only. Questions concerning this document should be directed to Mark Goodman, MDT Hydraulics Section, 406/444-6247. *This manual is written for use by professional engineers trained in hydraulics, and is not intended to completely cover the subject of highway hydraulics.*

This document has been created in WordPerfect 6.1, and includes text and graphics. Importing this document into other wordprocessing software, or other versions of WordPerfect, may create some format and/or graphics problems. Those portions of the Model Drainage Manual that are unique to MDT are shown in **bold**.

The following list contains changes that have been made to the chapters since their original issue. All changes will include an effective date, along with a description of the change. For deletions and additions, the description will include simply what was deleted or added. For changes, the description will include the previous criteria and the new criteria. These changes are approved using the same procedure that the original chapters use, which includes a review by a committee of Hydraulics staff members, followed by review by the Preconstruction Engineer and FHWA. It is the users responsibility to check this document regularly for changes.

### Changes to Hydrology Chapter 7

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|---------|---|
| 9/17/97 | Deleted nomograph for Mannings Equation (figure 7-3). Renumbered other figures.   |
| 9/17/97 | In Appendix B, corrected the list of weather stations, changing Gibbons Pass from Deer Lodge County to Beaverhead County. |
| 2/17/98 | On page 7-38, corrected Cf for the 50 year flow from 1.25 to 1.2. The Q50 was corrected from 68 cfs to 66 cfs.            |

### Changes to Hydrology Chapter 7

- 2/17/98 In Appendix A, Page 7-A-5, deleted the reference to Chapter 5 as a location for Procedure Memorandum No. 5. This Procedure Memorandum will likely be placed in a different chapter.
- 2/17/98 In Appendix A, Page 7-A-12, changed the discount rate to 7.125%, as reported in the November 7, 1997 Federal Register.
- 2/17/98 In Appendix B, added daily precipitation data for 219 stations.
- 5/28/04 On page 7–36, revised Channel Geometry USGS Report Number to 03–4308 to reflect new USGS publication.
- 5/28/04 At some time after 2/17/98, the Daily Precipitation tables were inadvertently removed from Appendix B. This revision adds the Daily Precipitation table back into Appendix B.
- 6/17/04 On page 7–67, corrected exponents in equation 7.24. Equation 7.24 is  $t_c = (t^{0.8} (S + 1)^{0.7}) / (1140 Y^{0.5})$
- 9/8/04 On page 7–59, percentages reflecting conditions for Open Space were moved from 'Average Percent Impervious Area' to corresponding condition under 'Cover Type and Hydrologic Condition.'

### Changes to Culvert Chapter 9

- 9/18/97 Added relationship between peak flow and runoff, for use in Wyoming Hydrograph Method, to Appendix G. This relationship was developed from analysis of 18 events documented by USGS at five gaging sites.
- 9/18/97 Added USGS Water Supply Paper 2056 to Reference list.
- 6/10/99 Revised section 9.3.4; pages 9-12; references to optional pipe policy.
- 2/16/00 Appendix E pages 9-E-2, 9-E-3, 9-E-4, and 9-E-5 were revised to reflect that fiber bonded CSP is no longer commercially available and should not be specified. Also note on page 9-E-4 that polymeric coating is available to 0.138" thickness.

### Changes to Storm Drain Chapter 13

- 6/22/04 On page 13–18, Table 13–1, the last 4 access hole sizes were increased to 54". A 36" pipe is too large for a 48" access hole.

AASHTO Model Drainage Manual, 1991  
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Note: **Bold** lettering indicates formal adoption of the chapter, and inclusion of MDT guidelines, by MDT Hydraulics Section. Other chapters are listed for reference only.